WE CLAIM:

1. A method of measuring a polarization dependent effect (PDE) in an optical communications system including a plurality of optical components, the method comprising:

   receiving an optical signal at a selected detection point of the optical communications system, the optical signal having been launched into the optical communications system with a predetermined initial polarization state;

   detecting a polarization state of the signal; and

   evaluating the PDE using the predetermined initial polarization state and the detected polarization state.

2. A method as claimed in claim 1, wherein the polarization dependent effect is either one of a polarization dependent gain and a polarization dependent loss.

3. A method as claimed in claim 1, wherein the optical signal comprises any one of: a data signal; a test signal; and an Amplified Spontaneous Emission (ASE) signal.

4. A method as claimed in claim 1, wherein the predetermined initial polarization state is substantially time-invariant.

5. A method as claimed in claim 4, wherein the predetermined initial polarization state comprises a

degree of polarization of the optical signal launched into the optical transmission system.

6. A method as claimed in claim 5, wherein the step of detecting the polarization state of the signal comprises a step of detecting a degree of polarization of the optical signal at the detection point.

7. A method as claimed in claim 6, wherein the step of detecting the degree of polarization of the optical signal comprises steps of:

splitting the optical signal into orthogonally polarized light beams;

detecting a respective power level of each of the orthogonally polarized light beams; and

evaluating the degree of polarization from the detected power levels.

8. A method as claimed in claim 4, wherein the predetermined initial polarization state comprises respective known initial power levels of orthogonally polarized signal components multiplexed into the optical signal.

9. A method as claimed in claim 8, wherein the step of detecting the polarization state of the signal comprises a step of detecting respective power levels of each of the orthogonally polarized signal components.

10. A method as claimed in claim 9, wherein the step of detecting the respective power levels comprises steps of:

de-multiplexing each of the orthogonally polarized signal components from the optical signal;

measuring respective eye openings of each of the de-multiplexed signal components.

11. A method as claimed in claim 1, wherein the step of evaluating the PDE comprises a step of calculating a vector difference between the detected polarization state and the initial polarization state.

12. A method as claimed in claim 1, wherein the predetermined initial polarization state comprises a predetermined variation of a polarization vector of the optical signal.

13. A method as claimed in claim 12, wherein the predetermined variation of the polarization vector comprises a rotation of the polarization vector in accordance with a predetermined dither pattern.

14. A method as claimed in claim 13, wherein the predetermined dither pattern comprises either one or both of:

a step-wise rotation of the polarization vector between orthogonal directions; and

a small-scale perturbation of a polarization angle of the polarization vector.

15. A method as claimed in claim 13, wherein the step of detecting the polarization state of the signal

comprises a step of detecting a degree of polarization of the optical signal as a function of time.

16. A method as claimed in claim 15, wherein the step of evaluating the PDE comprises a step of calculating a correlation between the predetermined dither pattern and the detected degree of polarization of the optical signal as a function of time.

17. A method as claimed in claim 12, wherein the predetermined variation of the polarization vector comprises variation of respective power levels of orthogonally polarized signal components multiplexed into the optical signal, in accordance with respective orthogonal dither patterns.

18. A method as claimed in claim 17, wherein the step of calculating the PDE comprises steps of:

detecting a power level of each of the received light beams as a function of time;

calculating respective correlations between the respective predetermined dither pattern and the detected power levels; and

evaluating the respective PDE as a ratio of the lesser of the calculated correlations to the sum of the calculated correlations.

19. A system for measuring a polarization dependent effect (PDE) in an optical communications system including a plurality of cascaded optical components, the system comprising:

a transmitter adapted to launch an optical signal having a predetermined initial polarization state into the optical communications system;

a polarization state detector adapted to detect a polarization state of the signal at a selected detection point; and

a processor adapted to evaluate the PDE using the predetermined initial polarization state and the detected polarization state.

20. A system as claimed in claim 19, wherein the transmitter comprises a polarization rotator adapted to selectively rotate a polarization vector of the optical signal.

21. A system as claimed in claim 19, wherein the transmitter comprises a controller adapted to selectively vary respective power levels of orthogonal signal components multiplexed into the optical signal, in accordance with respective orthogonal dither patterns.

22. A system as claimed in claim 19, wherein the detector comprises:

a beam splitter adapted to split the optical signal into respective orthogonally polarized beams; and

means for detecting respective power levels of each of the orthogonally polarized beams.

23. A system as claimed in claim 19, wherein the detector comprises:

a de-multiplexer adapted to de-multiplex orthogonally polarized signal components from the optical signal; and

means for detecting respective eye openings of each of the orthogonally polarized signal components.

24. An apparatus for measuring a polarization dependent effect (PDE) in an optical communications system including a plurality of optical components, the network element comprising:

a receiver adapted to receive an optical signal at a selected detection point of the optical communications system, the optical signal having been launched into the optical communications system with a predetermined initial polarization state;

a polarization state detector adapted to detect a polarization state of the signal; and

a processor adapted to evaluate the PDE using the predetermined initial polarization state and the detected polarization state.

25. A network element as claimed in claim 24, wherein the polarization dependent effect is either one of a polarization dependent gain and a polarization dependent loss.

26. A network element as claimed in claim 24, wherein the optical signal comprises any one of: a data signal; a test signal; and an Amplified Spontaneous Emission (ASE) signal.

27. A network element as claimed in claim 24, wherein the predetermined initial polarization state is substantially time-invariant.

28. A network element as claimed in claim 27, wherein the predetermined initial polarization state comprises a degree of polarization of the optical signal launched into the optical transmission system.

29. A network element as claimed in claim 28, wherein the detector comprises:

a beam splitter adapted to split the optical signal into orthogonally polarized light beams;

respective optical detectors adapted to detect a respective power level of each of the orthogonally polarized light beams; and

a comparator adapted to evaluate the degree of polarization from the detected power levels.

30. A network element as claimed in claim 27, wherein the predetermined initial polarization state comprises respective known initial power levels of orthogonally polarized signal components multiplexed into the optical signal.

31. A network element as claimed in claim 30, wherein the detector comprises:

a de-multiplexer adapted to de-multiplexing each of the orthogonally polarized signal components from the optical signal;

a signal analyzer adapted to measure respective eye openings of each of the de-multiplexed signal components.

32. A network element as claimed in claim 24, wherein the predetermined initial polarization state comprises a predetermined variation of a polarization vector of the optical signal.

33. A network element as claimed in claim 32, wherein the predetermined variation of the polarization vector comprises a rotation of the polarization vector in accordance with a predetermined dither pattern.

34. A network element as claimed in claim 33, wherein the predetermined dither pattern comprises either one or both of:

a step-wise rotation of the polarization vector between orthogonal directions; and

a small-scale perturbation of a polarization angle of the polarization vector.

35. A network element as claimed in claim 33, wherein the detector is adapted to detect a degree of polarization of the optical signal as a function of time.

36. A network element as claimed in claim 35, wherein the processor is adapted to calculate a correlation between the predetermined dither pattern and the detected degree of polarization of the optical signal as a function of time.

37. A network element as claimed in claim 32, wherein the predetermined variation of the polarization vector comprises variation of respective power levels of orthogonally polarized signal components multiplexed into the optical signal, in accordance with respective orthogonal dither patterns.

38. A method as claimed in claim 37, wherein the processor comprises:

a correlator adapted to calculate respective correlations between each of the predetermined orthogonal dither patterns and the detected power level; and

a calculator adapted to evaluate the PDE as a ratio of the lesser of the calculated correlations to the sum of the calculated correlations.